

Refusal of a code compliance certificate for a building with a “monolithic” cladding system: House 4

1 THE DISPUTE TO BE DETERMINED

- 1.1 This is a determination by the Building Industry Authority (“the Authority”) of a dispute referred to it under section 17 of the Building Act 1991 (“the Act”). The applicant is the territorial authority. The other party is the owner. The application arises from the refusal of the territorial authority to issue a code compliance certificate for an altered and extended house unless changes are made to its monolithic cladding system.
- 1.2 The Authority’s task in this determination is to consider whether it is satisfied on reasonable grounds that the new external cladding as installed (“the cladding”) on this house complies with the building code (see sections 18 and 20 of the Act). By “external wall cladding as installed” we mean the components of the system (such as the backing sheets, the flashings, the joints and the plaster and/or the coatings) as well as the way the components have been installed and work together.
- 1.3 The house itself is described in paragraphs 2.1 to 2.3, and paragraph 9 sets out the Authority’s final decision

2 PROCEDURE

The building.

- 2.1 The building is a detached two-storey house originally built in the 1980s. It is situated on a partly sloping site, and was transported to its current position in 1997, and then altered and extended to produce its current configuration. It is of conventional light timber frame construction and has a relatively simple shape, incorporating one deck and one wall/roof intersection. Eaves overhangs to the new section are approximately 450 mm wide. It is in a medium wind zone in terms of NZS 3604: 1999 “Timber framed buildings”.
- 2.2 The framing in the external walls is kiln-dried untreated timber. The Authority has not been provided with information as to the treatment, if any, of the timber in the existing original walls.
- 2.3 The majority of the exterior building is sheathed with what is known as a monolithic cladding system. The greater proportion of this cladding is fixed directly over the original shiplap Cedar boarding. Because of the boarding profile this latter application provides a form of cavity between the back of the new cladding and the boarding. The remainder of this cladding is face fixed to new framing timber. One remaining wall of the building is sheathed with fibre-cement weatherboarding (which is not monolithic) face fixed to new framing only.
- 2.4 As specified in its manufacturer’s July 1998 technical information manual (“the manufacturer’s instructions”), the monolithic cladding incorporates fibre-cement backing

sheets fixed through the building wrap directly to the framing timbers and finished with a choice of joint and coating systems. The manufacturer's instructions include details for flashings at various junctions (but not all of the junctions actually present in the house). For the purposes of this determination, the manufacturer of the fibre-cement sheets and the flashing kit is regarded as the manufacturer of the system, despite the fact that each of the joint and coating systems is itself proprietary to other manufacturers. The manufacturer's instructions identify the joint and coating systems by reference to those other manufacturers and their system brands, but give no other information about them. The joint and coating system used on this house was claimed by the owner to be one of those systems specified in the manufacturer's instructions. The owner also stated that a high build exterior acrylic paint was applied after the final spray coat. The Authority has not been unable to verify the materials used for that exterior coating.

- 2.5 The manufacturer has not issued a materials guarantee

Sequence of events:

- 2.6 The territorial authority issued a building consent on 16 July 1997. The consent was subject to "Conditions 1-17 for the Issue of Building Consent". None of these conditions related to the cladding. On receipt of amended documentation, the territorial authority issued a further building consent on 29 December 1997. This consent did not have any conditions attached and apparently amended the original consent in relation to the additions and alterations to the existing structure.

- 2.7 The territorial authority made various inspections in the course of construction and issued an interim code compliance certificate on 16 March 1999. The territorial authority carried out a final inspection of the building works on 3 October 2003.

- 2.8 The council inspector attached a handwritten note to a letter sent to the territorial authority by the builder on 15 October 2003. This stated

Discussed this with [a territorial authority official]-still require a report, but Council will now accept a report on the cladding from a member of an[Institute] who holds a Weathertightness Training Course Certificate.

- 2.9 On the territorial authority's "Building Officers Field Memorandum" dated 3 October 2003, it was noted:

Please arrange for a BRANZ accredited advisor to undertake a complete weathertightness investigation to check compliance with the NZ Building Code and provide Council with a written report.

- 2.10 The owner engaged an independent building inspector to inspect the building. This inspection was carried out on 22 November 2003, with the purpose of checking the weathertightness of the cladding. The inspector found that the cladding

...appears to be fitted according to the best trade practices at the time with head flashings and a good seal around the perimeter of the window and door frames. Several moisture meter readings were recorded throughout the dwelling and all recordings were within the required parameters of the New Zealand Building Code. A non-invasive Capacitance moisture meter was used and no readings were above 11%.

As with all Monolithic cladding some vigilance must be paid to any cracking or framing movement as this style of cladding relies on good quality sealers and paint for weathertightness.

- 2.11 The territorial authority informed the owner in a letter dated 4 December 2003 that:

In this particular instance the Council are unable to issue a code compliance certificate due to the fact the building is of face sealed construction with no cavity (ie a monolithic cladding system has been used without a cavity), these buildings in particular, have been found to suffer from weathertightness deficiencies.

2.12 On 24 December 2003, the territorial authority sent a letter to the applicant relating to its refusal to issue a code compliance certificate. In this letter, it was stated that

The only outstanding building item is in relation to the weathertightness issues that may occur as a result of the use of monolithic cladding without a cavity.

2.13 The territorial authority did not issue a notice to rectify as required by section 43(6).

2.14 The territorial authority applied for this determination on 6 January 2004.

3 THE SUBMISSIONS

3.1 The territorial authority provided copies of:

- Written correspondence between the parties;
- Field inspection notes and memos; and
- The 2 building consents that were issued.

3.2 The territorial authority also summarised the events surrounding, and its reasons relating to, the refusal to issue the code compliance certificate.

3.3 The owner provided copies of:

- The building consent documentation;
- The territorial authority inspection reports;
- The independent building inspector's report; and
- Written correspondence between the parties.

3.4 The owner also summarised the sequence of events leading up to the refusal of the territorial authority to issue a code compliance certificate.

3.5 Copies of the submissions and other evidence were provided to each of the parties. Neither the applicant nor the owner, responded to the submissions of the other party.

4 THE RELEVANT PROVISIONS OF THE BUILDING CODE

4.1 The dispute for determination is whether the territorial authority's decision to refuse to issue a code compliance certificate because it was not satisfied that the cladding complied with clauses B2.3.1 and E2.3.2 of the building code (First Schedule, Building Regulations 1992) is correct. Those provisions of the building code provide:

Clause B2 DURABILITY

B2.3.1 Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated, or:

- (a) The life of the building, being not less than 50 years, if:

- (i) Those building elements (including floors, walls, and fixings) provide structural stability to the building, or
- (ii) Those building elements are difficult to access or replace, or
- (iii) Failure of those building elements to comply with the building code would go undetected during both normal use and maintenance of the building.

(b) 15 years if:

- (i) Those building elements (including the building envelope, exposed plumbing in the subfloor space, and in-built chimneys and flues) are moderately difficult to access or replace, or
- (ii) Failure of those building elements to comply with the building code would go undetected during normal use of the building, but would be easily detected during normal maintenance.

Clause E2—EXTERNAL MOISTURE

OBJECTIVE

E2.1 The objective of this provision is to safeguard people from illness or injury, which could result from external moisture entering the building.

FUNCTIONAL REQUIREMENT

E2.2 Buildings shall be constructed to provide adequate resistance to penetration by, and the accumulation of, moisture from the outside.

PERFORMANCE

...

E2.3.2 Roofs and exterior walls shall prevent the penetration of water that could cause undue dampness, or damage to building elements.

- 4.2 There are no Acceptable Solutions that have been approved under section 49 of the Act that cover this cladding. The cladding is not accredited under section 59 of the Act. The Authority is therefore of the opinion that the cladding system as installed can be considered to be an alternative solution.
- 4.3 In several previous determinations, the Authority has made the following general observations about Acceptable Solutions and alternative solutions:
- Some Acceptable Solutions cover the worst case, so that in less extreme cases they may be modified and the resulting alternative solution will still comply with the building code.
 - Usually, however, when there is non-compliance with one provision of an Acceptable Solution, it will be necessary to add some other provision to compensate for that in order to comply with the building code.

5 THE EXPERT'S REPORT

- 5.1 The Authority commissioned an independent expert to inspect and report on the cladding. The expert stated that the cladding and its decoration appear to have been finished to a reasonable standard, and the cladding appears to be meeting the required performance standard in terms of the exclusion of moisture from entering the building. There was no evidence of any sheet or joint cracking at any location. The surface had been redecorated in the last 6 months. The expert confirmed verbally that new aluminium windows had been installed to the existing Cedar clad walls. The expert's report made the following specific comments on the as built cladding details:

- Vertical relief joints have not been provided;

- Some sheet joints were aligned with the jambs of windows;
- There is no sealing strip at the junction of the bottom edge of the cladding sheet and the concrete block foundation wall;
- The cladding generally terminates correctly above the finished ground level, but in one reasonably protected area it was too close to the ground;
- There is poor alignment at the bottom edge of the cladding over the existing vertical weatherboards, which places some abnormal stress on the backing sheets;
- The texture coating does not extend across the bottom edge of the cladding;
- The window sills are not face sealed; and
- There are questionable junctions between the deck and the cladding.

5.2 The expert also used a non-invasive moisture meter applied to the internal face of external walls to detect areas of moisture ingress. In addition, deep-penetration testing into the timber frame was also carried out. His figures indicated that generally moisture levels were between 12.6% and 16.6%, with an average of 14.78%. Moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure and that there is a consequent risk of decay in the structural timbers. While a moisture reading of less than 18% does not of itself indicate that the cladding is code compliant, it is indicative of the efficiency of the cladding in preventing moisture ingress to date.

5.3 Copies of the expert's report were provided to each of the parties. The territorial authority did not comment on the report but the owner made the following comments on the report:

- The eaves were 600 mm wide on the original portion of the house and 480 mm wide on the new addition;
- The yellow expanded foam gap filler was only used to fill the gap for a second cosmetic soffit under the cantilever behind the original cladding; and

The owner also had verified that building paper had been used on the original portion of the house.

6 THE AUTHORITY'S VIEW

General

6.1 The Authority has considered the submissions of the parties, the expert's report and the other evidence in this matter. The Authority's approach to determining whether building work complies with clauses E2.3.2 is to examine the design of the building, the surrounding environment, the design features that are intended to prevent the penetration of water, the cladding system, its installation, and the moisture tolerance of the external framing.

Weathertightness risk

6.2 Recent New Zealand data and experience indicates that the impact of weathertightness problems in monolithic clad houses can be minimised if good and effective design and construction practices are followed.

- 6.3 The installation of exterior cladding to manufacturer's specifications and to accepted good trade practice is a fundamental requirement to ensure good weathertightness performance.
- 6.4 The next priority is to reduce the ability of moisture to get through the cladding by utilising design measures that minimise the effects of the rain impacting on the walls:
- 6.5 The main areas for consideration are:
- Data shows a strong relationship between the width of the eaves and the incidence of wall leaks. An effective deflection mechanism, such as eaves greater than 600 mm wide, has been shown by Canadian data to manage more than 90% of rain incidents;
 - While most reported leaks are substantially caused by defects in the cladding that require little or no wind pressure differential, the Authority believes that homes in high and very high wind zones (as defined by NZS 3604) are likely to experience wind pressure differentials and thus a higher risk of water ingress;
 - Taller buildings result in an effective increase in the catchment area of the wall. Available data suggests a clear correlation between higher number of storeys and an increased incidence of leaking;
 - Complex roofs and overall envelope shapes where the roofs frequently intersect with the walls on upper floors create opportunities for leaks to directly penetrate into the wall; and
 - Recent data also shows that decks and balconies that are exposed in plan and/or cantilevered out from the external walls are the most frequent location for water leaks.
- 6.6 Any likely penetration of moisture through the cladding can then be addressed by a combination of effective drainage, ventilation of the drainage cavity and moisture tolerance in the external wall framing timber. These factors being:
- The structure should allow water that has penetrated the cladding to drain out as quickly as possible. The Authority believes that generally a drainage cavity should be provided behind the outer cladding barrier in monolithic construction;
 - The design of the outer walls should allow walls to dry to the outside once moisture penetrates the cladding and the moisture barrier. If walls do not dry, decay fungi can become established in as little as 3 months. Until scientific data on the optimum depth and configuration of the ventilation mechanism in New Zealand conditions is available, the Authority believes that the drainage cavity should be not less than 20 mm deep; and
 - The external walls should have some degree of decay resistance or moisture tolerance to allow for situations when moisture circumvents the cladding and moisture barriers and moisture levels in the timber rise to more than 18%.
- 6.7 In relation to these characteristics, the Authority finds that this house:
- Has eaves that are generally 450 mm wide to the new extension and 600 mm wide to the existing building, both of which are considered to be reasonably effective in shielding the cladding;
 - Is in a medium wind zone;

- Has widow head flashings;
- Is constructed to two levels;
- Has only one wall/roof intersection and has an overall envelope that is relatively simple in shape;
- Has one deck, which is supported independent of the building and is not built over a living space;
- Has face-fixed cladding with no drainage cavity except where fixed over the existing cladding where a form of cavity exists, and
- Has new external walls that are constructed from non-treated timber, which will not delay the onset of decay.

Weathertightness performance

- 6.8 Generally the cladding appears to have been installed according to good trade practice and to manufacturer's instructions. It can be considered to be reasonably effective in preventing the penetration of water. There are some defects, including lack of relief joints, the base terminations and the window sill and deck junctions with the cladding. These need to be addressed to ensure ongoing weathertightness.
- 6.9 Notwithstanding the fact that the backing sheets are fixed directly to the timber framing, and thus inhibiting the ventilation, the Authority finds that there are compensating factors that assist the performance of the cladding. These are:
- The generally low weathertight risk factors;
 - Apart from some details, the cladding appears to have been carefully installed according to good trade practice and to manufacturer's specifications;
 - The moisture level readings do not indicate any undue moisture ingress behind the cladding at this time.
- 6.10 The Authority considers that these factors adequately compensate for the lack of a drainage cavity and allow the house to comply with the weathertightness provisions of the building code.

7 CONCLUSION

- 7.1 The Authority accepts that the expert's report establishes that the cladding complies in most respects with the manufacturer's instructions. As at the time of the consideration of this determination there is no evidence of external moisture entering the building, the Authority has decided that the cladding on this particular building complies with clause E2.
- 7.2 While the building does not show any signs of water ingress at the present time, this building will also have to comply with the durability requirements of clause B2. The Authority finds that when the cladding faults have been satisfactorily rectified this house will comply with clause B2 requirements. It is essential that all the items of rectification be competently carried out to ensure such compliance, especially as the exterior framing is constructed with non- treated timber, which has no resistance to decay. In addition, clause B2.3.1 of the building code requires "normal maintenance". That term is not defined, so that the Authority takes the view that it must be given its ordinary and natural meaning in

context. In other words, normal maintenance of the cladding means such inspections and activities such as regular cleaning, re-painting, replacing sealants, and so on.

- 7.3 The Authority finds that the required items of rectification are those set out below and which are detailed more specifically in the expert's report:
- Vertical relief joints to be installed where required;
 - An examination to check that the sheet layout does not add to the weathertightness risk and 'if there is a risk' to remedy any defective layout;
 - All remedial work to the cladding base terminations, including ground clearances and coatings;
 - An examination as to the integrity of the window jamb and sill junctions with the cladding and their replacement if necessary; and
 - The deck/cladding junctions and deck attachment.
- 7.4 The Authority emphasises that each determination is conducted on a case-by case basis. Accordingly, the fact that a particular cladding system has been established as being code compliant in relation to a particular building does not necessarily mean that the same cladding system will be code compliant in another situation.
- 7.5 The Authority declines to incorporate any waiver or modification of the building code in its determination.

8 WHAT IS TO BE DONE?

- 8.1 It is not for the Authority to decide how the cladding is to be brought to compliance with the building code. That is a matter for the owner to propose and for the territorial authority to accept or reject, with either of the parties entitled to submit doubts or disputes to the Authority for another determination.

9 THE AUTHORITY'S DECISION

- 9.1 In accordance with section 20 of the Building Act, the Authority determines that the cladding complies with clause E2 but, for the reasons set out in paragraph 7.2, does not comply with clause B2 of the building code. Accordingly, it confirms the territorial authority's decision to refuse to issue the code compliance certificate.
- 9.2 The Authority finds that because of the compensating factors in this case, the lack of a drained cavity behind some of the cladding is not, on its own, sufficient grounds to withhold a code compliance certificate.
- 9.3 The Authority, therefore, finds that once the items of non-compliance that are listed in paragraph 7.3 are rectified to the approval of the territorial authority, together with any other instances of non-compliance that become apparent in the course of rectification, the cladding as installed on the house will comply with the building code, notwithstanding the lack of a drainage cavity.
- 9.4 The Authority considers that the cladding will require on-going maintenance to ensure its continuing code compliance, and that this maintenance programme should be undertaken after consultation with the territorial authority.

Signed for and on behalf of the **Building Industry Authority**
on 22 April 2004

John Ryan
Chief Executive